MANPRINT Quarterly

Summer/Fall 1999

Director's Corner

I should like to begin this message by stating that it has been exciting and challenging serving as the Acting Director of the Army's MANPRINT program for almost one year. Hopefully a decision will be made in the not to distant future regarding a permanent Director. Until that time I shall continue to represent the program and its dedicated personnel in the strongest way I can.

The recently completed MANPRINT Symposium was, from my perspective, a resounding success. Not only did we have the benefit of hearing from some of the senior players in the Army's MANPRINT program, but we also had the opportunity to hear from our colleagues regarding newly developed MANPRINT tools as well as from military and civilian personnel involved in MANPRINT in military organizations outside the United States.

My personal inclination at the end of the Symposium was to convene the next gathering every two years. However, feedback I have received from many individuals involved in the conduct of MANPRINT activities have convinced me that we should plan on having this as an annual event. Accordingly, I am developing plans with the MANPRINT staff here at HQDA ODCSPER, as well as with members of the community at large, to identify an appropriate venue for our next meeting -- MANPRINT 2000!

The fall here at the Pentagon is characterized by many events. One of these is the development of requirements for resources for the coming POM. As Director, I have initiated work with key representatives of the MANPRINT community to identify resource requirements that will be needed to ensure a proactive and positive program as we move into the 21st Century.

The MANPRINT program within the Army is presently enjoying strong support both at the Chief of Staff and Vice Chief of Staff levels as well as among the Secretariat. The DCSPER, LTG Ohle, is a very strong supporter and will give the keynote address at the forthcoming Human Factors Society meetings sponsored by the Ministry of Defence in London, England.

As always, the hard work and dedication of each of you -- the MANPRINT practitioners throughout our Army -- are the one's who continue to make this a viable program. Here's wishing each of you well in the coming months.

Dr. Bob Holz
Director (Acting)
MANPRINT

Contents...

MANPRINT Practitioner's Guide to the Army's Joint Technical Architecture (JTA): Computing Consistency for the Soldier

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With the Army moving quickly toward computing systems as a force multiplier, the need has arisen for a common technical architecture for the transfer of information between systems. Technical architecture, as it is referred to here, is a set of rules, or building codes. These consist of standards and protocols which help provide a consistent interface for computing systems that require the use and exchange of electronic information. The Army and the Department of Defense (DoD) as a whole has been working toward a joint technical architecture (JTA) to meet this need.

As part of the process, product acquisition teams are being required to implement the mandates of the JTA. Although most of the standards and guidelines relate to information transfer, technical architecture also includes rules for a common human-computer interface (HCI). The MANPRINT practitioner, therefore, as a part of the team, needs to understand the JTA and how the soldier might best be served by its implementation during acquisition, development, and modification of a system.

What is the JTA?

The JTA has been defined as "the minimum set of performance based, primarily non-government, standards needed to maximize interoperability and affordability" within DoD (Gansler, Money & Buchholz, 1998). The JTA for the Army (JTA-A) is the Department of the Army's (DA) implementation of the DoD JTA. The objectives for the use of the JTA are threefold: (1) to provide a foundation for a seamless flow of information and interoperability among all tactical, strategic, and sustainment combat support systems that produce, use, or exchange information electronically; (2) to mandate standards and guidelines for system development and acquisition that will reduce cost, development time, and fielding time for improved systems; and (3) to communicate to industry the Army's intent to consider commercial products and implementations (DA, 1998).

The Army's JTA developed from recommendations of the 1994 Army Science Board. In order to meet the Army's needs for interoperability, the mandates, standards, and guidelines have been consolidated into one summary document—the JTA-A. The first Army C4I Technical Architecture, Version 3.1 (DA, 1995) was mandated for use by the Army acquisition community. It included a requirement to develop a plan for the migration of all systems to the mandated standards. Later versions augmented, modified, and clarified the requirements, incorporating improvements as well as expanding the scope to address needs of specific weapon systems, sustaining base systems, and information security.

It should be noted that the JTA and the JTA-A are different documents with separate version numbers. The current JTA is Version 2.0 and the current JTA-A is Version 5.5. The differences are not great, but for Army systems, the JTA-A will commonly be required on procurement contracts. The focus of this paper is the JTA-A.

Benefits of the JTA-A

The use of a common technical architecture provides a number of benefits for the development and operation of computing systems. It designates, up front, protocols and standards for systems that require interoperability, that is, their need to communicate with one another. It allows application soft-

Continued on page 3

Continued from page 2

ware and process models to be reused in similar systems, thereby reducing the time as well as funding required for development. The use of open commercial systems technologies, developed for the private sector, offers the potential for increased cost savings.

In the MANPRINT arena, maintaining a common HCI across systems will make the systems easier to use and improve performance by making the interface consistent with user expectations. Characteristics that allow ease and retention of learning can also reduce training time, help to keep skill levels lower, and maintain or even reduce personnel requirements.

A SYNOPSIS OF THE JTA-A

The JTA-A document consists of six sections and a number of appendices. The sections are (1) Overview; (2) Information Processing Standards; (3) Information Transfer Standards; (4) Information Modeling and Data Exchange Standards; (5) Human-Computer Interfaces; and (6) Information Security. These sections provide the core standards that apply to all systems. Among the appendices are acronyms, references, a glossary, and the four system-domain requirements. In the JTA-A, the system-domains are related functional areas, for example, command, control, communications, and intelligence (C3I) systems.

Two sections that are especially important for the MANPRINT practitioner are Section 5 (Human-Computer Interfaces) and the domain appendices (D through G in the current Version 5.5).

Section 5 Human-Computer Interfaces

This section provides the framework for a common HCI design and implementation across Army systems. The objective is to standardize the user interface so that applications appear and behave in a consistent manner. This standardization can result in higher productivity, shorter training time, and reduced development, operation, and support costs.

The graphical user interface (GUI) is the preferred user interface, and the Army's goal for the near term is to convert all character-based interfaces to GUIs. Specialized interfaces may still require character-based interfaces, but the domain-level style guide must define these interfaces. GUIs and character-based interfaces are not to be mixed within an application.

GUIs are to be based on commercial user interface styles but also use the DoD HCI style for high-level design guidance. Hybrid GUIs, combining different styles, are not authorized.

When used, character-based interfaces are to be based on the DoD HCI Style Guide (DoD, 1996b). Guidelines for Designing User Interface Software (Smith & Mosier, 1986) may be used but is not mandated. For common symbology, MIL-STD 2525A, Common Warfighting Symbology (DoD, 1996a) is to be followed.

The Hierarchy of HCI Style Guides

Section 5 identifies the hierarchy of HCI style guides. This hierarchy is to be followed to maintain consistency for the design of a good HCI. Figure 1 shows the guidelines and standards to be used beginning with the top-level general guidance, through the prototyping process, down to the specific design rules.

Commercial style guides. The commercial style is selected based on the choices made from the mandates in Section 2 (User Interface Services and Operating System Services). For Motif™ based systems, the JTA-A mandates the OSF/Motif™ Style Guide (Open Software Foundation, 1992). When the developer uses the common desktop environment (CDE) for desktop management, the user interface shall be based on and consistent with the CDE version of Motif™. If a Windows® based environment has been selected, the Windows® Interface Guidelines (Microsoft Corporation, 1995) will be used.

DOD HCI Style Guide. The DoD HCI Style Guide (DoD, 1996) is a high-level design document which focuses on consistency in GUI design. It provides the engineer with good, overall HCI design recommendations. It contains detailed log-in and log-off procedures, screen and window design, information presentation, labeling, color usage, navigation, and

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Continued from page 3

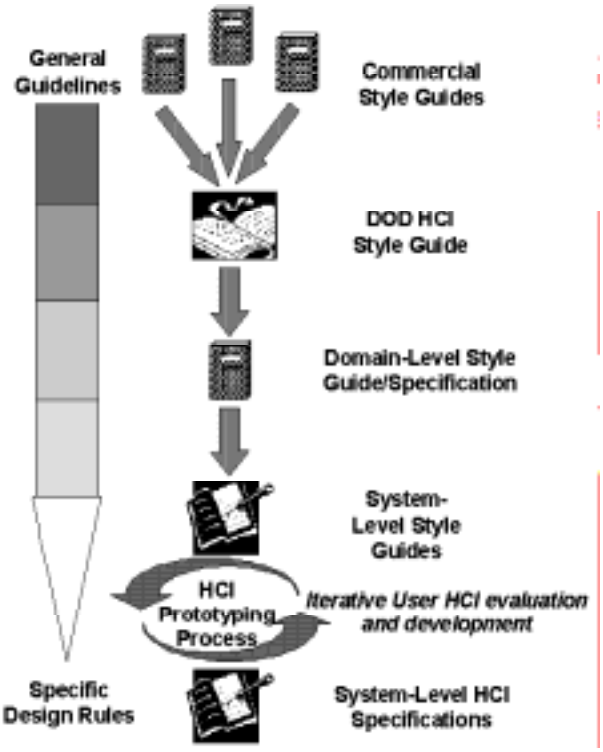

Figure 1. The hierarchy of style guides that are to be followed to maintain consistency of the human-computer interface design (From DA, 1998).

format of menus. Relevance to DOD systems is evident in discussions about mapping, security classification, decision aids, and embedded training.

Although this style guide focuses on GUI design, it also contains computer interface design criteria that can be used for various types of Army systems such as those that are primarily character based. The DoD HCI Style Guide is not a compliance document, but it does present DoD policy to date and, as such, should be taken seriously.

Domain-level Style Guide. The domains referred to by the JTA-A are groupings of systems with related functions, requirements, and capabilities. Because of their similarities, there is a high potential for use of the same, or similar, software. The domains referred to by the JTA-A are as follows: (1) Combat Support and Sustainment, (2) C3I, (3) Weapons System, and (4) Modeling and Simulation.

Each specific domain is required to identify or develop a domain-level style guide to meet the domain needs. These guides are to include the approved Army HCI appearance and behavior, or "look and feel." The domain-level style guides are compliance documents.

The C3I domain adopted the User Interface Specification for the Defense Information Infrastructure (DII) (Defense Information Systems Agency (DISA) 1998). This document provides specific guidance about screen design, information presentation, screen organization, labeling, color usage, window design and navigation, and format of menus and submenus.

The Weapons System domain in turn has adopted the Weapon Systems Human-Computer Interface (WSHCI) Style Guide (DA, 1997).

To date, the other two domains have not specified their own individual style guides. Until they do, the JTA-A mandates the DoD HCI Style Guide (DoD, 1996) and the User Interface Specification (DISA, 1998). Table 1 summarizes the domain-level style guide requirements.

Table 1. Summary of the domain-level style guides from Section 5 of the Joint Technical Architecture-Army (JTA-A) and the domain appendices (DA, 1998).

DOMAIN	DOMAIN SPECIFIC HCI DOCUMENTS
Combat Support and Sustainment	DoD HCI Style Guide (DoD, 1996) User Interface Specification (DISA, 1998)
C3I	User Interface Specification (DISA, 1998)
Weapons System	Weapon Systems Human-Computer Interface (WSHCI) Style Guide, Version 2.0. (DA, 1997)
Modeling & Simulation Domain	DoD HCI Style Guide (DoD, 1996) User Interface Specification (DISA, 1998)

Continued from page 4

System-level HCI. Special tailoring may be needed for individual programs. The commercial, DoD, and domain style guides are too broad to cover specifics of each program with unique system requirements.

The JTA-A provides for the preparation of supplemental information to be documented in a system-level guide created by MANPRINT practitioners as an appendix to the domain-level HCI guide. This allows explicit design rules and exact guidance for consistency in the "look and feel" missing from the previously mentioned guides.

WORKING WITH THE JTA-A

The JTA-A is a tool that the MANPRINT practitioner can use to guide the development or modification of a software program. In the early days of working with massive computing systems, this was like trying to control the limbs of an octopus. When the HCI development was not centralized, controls as simple as the shape of a cursor might be different within the same program. Although the JTA-A can be a good tool, the practitioner needs to be aware of a number of things to effectively use this tool.

- The version of the JTA-A specified on the contract.

The JTA-A is periodically revised to clarify and improve the guidance provided. As mentioned earlier, the current version is 5.5, but earlier versions, including the JTA-A predecessor documents, may be specified on a contract. Table 2 summarizes the documents and versions. When working on contractual programs, the practitioner must determine (1) which version of the JTA-A is on contract, (2) what commercial and domain style guide versions are on contract, and (3) must understand whether they are guidelines or mandates. Questions, including contractual concerns, may arise about differences between versions, and the practitioner may be required to make a recommendation.

The User Interface Specification (UIS) was updated from version 2.0 (DISA, 1996) to version 3.0 (DISA, 1998) in JTA-A 5.5. According to the UIS developers, version 2.0 follows the principles of Windows™ 3.1 and UIS version 3.0 follow Windows NT™. In Windows™ 3.1, the window title bar, window title, and window control buttons look and act differently than they do in Windows NT™. Another example is that in Windows™ 3.1, the key combination <Ctrl><Esc> displays a window listing currently running applications, whereas, in Windows NT™, this key combination displays the "start" menu.

Table 2. Summary of the Joint Technical Architecture-Army (JTA-A) guides and specifications with the most likely versions to be on contract.

GUIDE/SPEC	VERSIONS	WHAT IS COVERED
JTA-A	4.5, 5.0, 5.5	Overall guidelines
JTA-A Section 5		HCI for application development, Emerging standards
JTA-A Section 6.5		HCI for security
JTA-A Appendix D-G		Domain standards
DOD HCI	2.0, 3.0	Overall HCI guidelines GUI and character based design
UIS DII	2.0, 3.0	Overall HCI for GUI design of Motif™ and Windows™ based systems

The same is true for the HCI style guide (DoD, 1996) which was revised to be more process oriented. It contains illustration and editorial changes, additional material, and provides updated guidance.

- The domain of the system.

The MANPRINT practitioner needs to know the domain of the system to identify the domain-level style guide. The systems covered by each domain are defined in the Domain-level Appendices, D through G of the JTA-A Version 5.5. For earlier versions of the JTA-A, the specific appendices are different.

These appendices define the specific needs of the functional domain areas, domain specific standards and guidelines.

Continued on page 6

Continued from page 5

The system domains are listed in Table 1, which also includes the domain-level style guide as specified in Section 5 and the appendices of the JTA-A. Note that the domain-level guides may differ depending upon the version of the JTA-A. As an example, there are two versions of the User Interface Specification, either one of which may be on contract.

- Security requirements for the system.

The importance of Army security needs no explanation. With computing systems, there is often a need to authenticate persons and equipment. For example, identifying users (who's out there?) and end systems (what's out there?) How this information is to be presented to the users is covered only in a general way. The practitioner can find some HCI security information in Section 6.5 of the JTA which in turn refers to the DoD HCI Style Guide (DoD, 1996), Appendix A "Security Presentation Guidelines." This appendix specifically covers security banners and screen labels.

- Developing a system-level guideline.

There are many sources a practitioner can use to develop the system-level style guide. These include the DoD HCI style guide, government and commercial guides relevant to the system, and the Domain-level Style Guides. Additionally, and of special interest to practitioners, is the fact that input from HCI specialists is required as part of system-level style guide development. An example of the system-level guideline (Anderson, 1999) updates the contractual specification and further refines details of the system HCI.

- Compliance tools for the MANPRINT practitioner.

The Army Digitization Office has the lead for monitoring progress toward compliance with the JTA-A. A Defense Information Infrastructure (DII) Common Operating Environment compliance checklist is provided in Appendix B of the COE Integration and Runtime Specification (DISA, 1997) which can be used to help determine the level of compliance in specific areas such as operating system, network services, GUI environment, database services, and security.

A checklist that helps determine HCI compliance is available for the User Interface Specification (UIS). There are some differences between UIS version 2.0 and UIS version 3.0. For UIS version 2.0 (DISA, 1996), see Appendix I, User Interface Specification Checklist. For version 3.0, Appendix I has been changed to Style Requirements for DII Compliance. The version 3.0 copy of the checklist is the DII Style Compliance Checklist Revision 18 November 1997. It is available from the UIS developers (Kathy Fernandes at fernande@io.nosc.mil).

- Iterative User HCI Development and Evaluation.

The style guide by itself will contribute to a consistent "look and feel" but does not ensure the user-computer interface will be efficient and well designed. HCI specialists must be involved in the software design process. Activities include analysis efforts such as evaluating the predecessor system (since some legacy systems are not suitable for JTA tailoring); development of operator tasks; analysis of user needs; analysis and allocation of functions; and analysis of tasks and workload. The HCI specialists' design work must include iterative development and evaluation of software prototypes as shown in Figure 1. This needs to be followed by usability testing with target users to prove the design. All of these activities, in addition to the use of the style guides, provide the best opportunity for the development of a good HCI.

CONCLUSION

The JTA-A is mandated for all systems involved in electronic information exchange. To implement this, DA requires all management as well as development and acquisition personnel to use the JTA-A on new procurements and system improvements.

MANPRINT practitioners are required to be a part of the development of systems that have JTA-A rerequirements on contract and apply their knowledge to system development. This promises benefits for the soldier-operator of these systems, but to take advantage of the JTA-A, practitioners need to stay abreast

Continued on page 7

Continued from page 6

of these tools and make the best use of them during program development.

MORE INFORMATION

Many of the documents can be obtained on line. These are noted in the references with web addresses. Also, a number of web sites are available for additional information about the JTA-A and DoD JTA.

- Information about the DoD JTA can be had at http://www-jta.itsi.disa.mil/.
- Information about the DII COE with links to related topics, http://spider.osfl.disa.mil/cm/cm_page.html
- For comments on the next version of the JTA—October 1999, http://arch-odisc4.army.mil/aes/aea/jta-a/html/jtap.htm.
- For Open Group common desk top environment and Motif™ documentation, see web site, http://www.opengroup.org/ public/pubs/catalog/mo.htm.

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MANPRINT Symposium 1999
Shaping MANPRINT for the Next Millennium

By all standards, the 2-day MANPRINT Symposium held at the Crystal Gateway Marriott in Crystal City, Virginia on 18-19 August 1999 was a success. There were over 140 attendees and comment sheets reflected the positive impressions of the entire symposium, including speakers, agenda, and facilities.

Major General John M. LeMoyne, Assistant Deputy Chief of Staff for Personnel, gave the opening remarks and presented the MANPRINT Achievement Awards for 1998. Awardees included:

Richard Brown, Combat Developer Category, Combined Arms Command, TRADOC Program Office - ABCS, Ft. Leavenworth, KS
Dr. Beverly Knapp, Army Materiel Program Category, Army Research Laboratory - Human Research and Engineering Directorate Field Element, Ft. Huachuca, AZ
Air Warrior Team (David Harrah, Richard Kozychi, and Luci Salvi), MANPRINT Technology, Research and Development Category, Army Research Laboratory - Human Research and Engineering Directorate, Aberdeen Proving Ground, MD
Special Achievement Awards were presented to:
Colonel Bruce Jette, PM Soldier
Colonel Henry L. Kinnison, TSM Soldier

The keynote speaker was Mr. Patrick Henry, Assistant Secretary of the Army (Manpower and Reserve Affairs). Mr. Henry addressed some of the major issues facing today's Army, each of which has major MANPRINT implications.

There were exceptional presentations from a wide array of guest speakers. The gist of their presentations are available on the MANPRINT Web Page at: www.manprint.army.mil.

LTG Randall L. Rigby, DCG, US Army Training & Doctrine Command
MG John S. Parker, CG, US Army Medical Research & Materiel Command
MG Albert J. Madora, CG, US Army Test and Evaluation Command
Mr. Stanley Levine, Deputy Director, Army Digitization Office
Dr. Robin Keesee, Director, Army Research Laboratory - Human Research & Engineering Directorate
Mr. L. Taylor Jones, Director, Targets, Test & Evaluation, Military Technology, Inc.
Team Crusader (PM, TSM, Program Director)
Representatives from UK, Canada, Germany, Israel
Ms. Marjorie Zelko and Mr. Jim Inman, Regulation status
Subject matter expert panels addressing MANPRINT tools

The symposium concluded with Dr. Robert F. Holz, Acting Director, Personnel Technologies Directorate, Office of the Deputy Chief of Staff for Personnel, reminding the audience that resourcing is the key to a successful MANPRINT program. Additionally, Dr. Holz stressed the need for MANPRINT practitioners to become involved early in the acquisition process.

FY 99 MANPRINT Training Schedule

MANPRINT ACTION OFFICER COURSE (MAOC)

CLASS	START DATE	END DATE	LOCATION
00-001	31 Jan 00	10 Feb 00	Ft Lee, VA
00-703	21 Mar 00	30 Mar 00	Ft Knox, KY
00-701	16 May 00	25 May 00	Ft Leonard Wood, MO
00-002	07 Aug 00	17 Aug 00	Ft Lee, VA
00-702	22 Aug 00	31 Aug 00	Redstone Arsenal, AL

MANPRINT TAILORED TRAINING (APPLICATIONS COURSE)

CLASS	START DATE	END DATE	LOCATION
99-704	28 Sep 99	30 Sep 99	Ft Gordon, GA
00-703	16 Nov 99	18 Nov 99	Ft Bliss, TX
00-704	18 Apr 00	20 Apr 00	Ft Huachauca, AZ
00-001	08 May 00	10 May 00	Ft Lee, VA
00-701	27 Jun 00	29 Jun 00	Industrial Operations Command
00-702	01 Aug 00	03 Aug 00	Warren, MI

(POC: Mr. Len Girling, COM (804) 765-4361, DSN 539-4361)

Meeting of Interest

AUSA Annual Meeting

11 – 13 October 1999

Marriott Wardman Park Hotel
2660 Woodley Road,
Connecticut Avenue, NW
Washington, DC 20008

Omni Shoreham Hotel
2500 Calvert Street, NW
Washington, DC 20008

Metro Rail Red Line: Woodley Park/Zoo Station
Non-members of the AUSA may register at the Sheraton Washington

MANPRINT INFORMATION

Articles, comments, and suggestions are welcomed. Submit to: MANPRINT Quarterly, HQDA (DAPE-MR), 300 Army Pentagon, Washington, DC 20310-0300; DSN 225-7035, COM (703) 695-7035, FAX (703) 697-1283, E-mail: simmoms@hqda.army.mil

POLICY: Department of the Army, ODCSPER, ATTN: DAPE-MR, 300 Army Pentagon, Washington, DC 20310-0300, DSN 225-7035, COM (703) 695-7035.

DIRECTORY OF DESIGN SUPPORT METHODS: Defense Technical Information Center–MATRIS Office, DTIC-AM, NAS North Island, Box 357011, Bldg. 1482, San Diego, CA 92135-7011, DSN 735-8750/1, COM (619) 545-8750/1, E-mail:ddsm@dticam.dtic.mil, and World Wide Web: http://dticam.dtic.mil/hsi/

MANPRINT DOMAIN POCs:

MANPOWER, PERSONNEL & TRAINING:
Mr. Steve Dwyer, U.S. Army Training and Doctrine Command, ATTN: ATCD-RP, Fort Monroe, VA 23651- 5000, DSN 680-3477, COM (757) 727-3477, FAX: 680-2483, E-mail: dwyers@monroe.army.mil. Mr. Arthur L. Pridemore, U.S. Total Army Personnel Command, ATTN: TAPC-PLC-M, 200 Stovall Street, Alexandria, VA 22332-0406, DSN 221-2024, COM (703) 325-2024, FAX: 221-0657, E-mail: pridemoa@hoffman.army.mil

HUMAN FACTORS ENGINEERING: Dr. Edwin R. Smootz, Chief, Human Factors Integration Division, HRED, Army Research Laboratory, ATTN: AMSRL-HR-M, Aberdeen Proving Ground, MD 21005-5425, DSN 298-5817, COM (410) 278-5817, FAX: 298-8823, E-mail: esmootz@arl.mil

SYSTEM SAFETY: Mr. Dwight Lindsey, U.S. Army Safety Center, ATTN: CSSC-ISE, Fort Rucker, AL 36362-5363, DSN 558-1373, COM (334) 255-1373, FAX: 558-9528, E-mail: lindseyd@safety-emh1.army.mil

HEALTH HAZARDS: Mr. Mike McDevitt or Mr. Bob Gross, U.S. Army Center for Health Promotion and Preventive Medicine (USACHPPM), ATTN: MCHB-DC-OHH, Aberdeen Proving Ground, MD 21010-5422, DSN 298-5878, COM (410) 436-2925, FAX: 298-1016, E-mail: w.michael.mcdevitt@apg.amedd.army.mil or robert.gross@apg.amedd.army.mil

SOLDIER SURVIVABILITY: Mr. Richard Zigler, U.S. Army Research Laboratory, ATTN: AMSRL-SL-I, Aberdeen Proving Ground, MD 21005-5068, DSN 298-8625, COM (410) 278-8625, FAX: 298-7254, E-mail: rzigler@arl.mil

Bob Holz
Acting Director for Personnel Technologies

The MANPRINT Quarterly is an official bulletin of the Office of the Deputy Chief of Staff for Personnel (ODCSPER), Department of the Army. The Manpower and Personnel Integration (MANPRINT) program (AR 602-2) is a comprehensive management and technical initiative to enhance human performance and reliability during weapons system and equipment design, development and production. MANPRINT encompasses the seven domains of personnel capabilities, manpower, training, human factors engineering, system safety, health hazards and soldier survivability. The focus of MANPRINT is to integrate technology, people, and force structure to meet mission objectives under all environmental conditions at the lowest possible life-cycle cost. Information contained in this bulletin covers policies, procedures, and other items of interest concerning the MANPRINT Program. Statements and opinions expressed are not necessarily those of the Department of the Army. This bulletin is prepared quarterly under contract for the Personnel Technologies Directorate, Office of the Deputy Chief of Staff for Personnel under the provisions of AR 25-30 as a functional bulletin.

READER'S RESPONSE

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